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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,531	09/22/2003	David R. Brown	MEMS-0196-US	5924
60601	7590	08/29/2006	EXAMINER	
MCGRATH, GEISLER, OLDS & RICHARDSON, PLLC P.O. BOX 1364 FAIRFAX, VA 22038-1364			CHACKO DAVIS, DABORAH	
			ART UNIT	PAPER NUMBER
			1756	
DATE MAILED: 08/29/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/665,531

Applicant(s)

BROWN, DAVID R.

Examiner

Daborah Chacko-Davis

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6-15,17-31,33 and 34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-15,17-31,33-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 06/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 8-12, 15, 19-22, 25-30, 33, and 34, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,534,242 (Sugita et al., hereinafter referred to as Sugita) in view of U. S. Patent No. 6,444,399 (Nakasuji).

Sugita, in the abstract, in col 4, lines 54-67, in col 5, lines 1-67, in col 8, lines 1-29, in col 15, lines 1-67, in col 16, lines 1-4, in col 21, lines 35-67, in col 22, lines 1-42, in col 23, lines 12-35, in col 31, lines 43-58, in col 33, lines 30-50, in col 64, lines 59-67, in col 65, lines 1-33, discloses an exposure process comprising providing a resist coated substrate, illuminating the resist layer using energy sources through a mask (reticle), the illumination process is a multiple exposure process performed using a step-and-repeat process, wherein each exposure processes are offset by an amount (defocus amount) such that two exposures do not write on the same path; said mask has a pattern to be replicated on the resist coated substrate (radiation passing through the mask is controlled, the pattern on the reticle is an array of features to be replicated on the resist layer), performing the exposure processes (step-and-repeat, first exposure process, partial exposure) until the entire substrate is scanned, repeating a second exposure process (to fully expose the resist layer) using a step-and-repeat process

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wherein the number of passes (can be more than 4, see figure 35) is at least 4, and that each scan (sweep) is offset a certain amount ($1/8$ for 8 passes, $1/n$ for "n" no. of passes), developing the exposed photoresist layer, and etching the remaining exposed portions, followed by stripping (removing the remaining photoresist portions, and post-processes such as heating) to form a desired substrate contour (forming a mask based on the circuit pattern design, forming circuit patterns on the wafer, forming an array of microstructures) (claims 1-4, 10-12, 15, 21-22, 30, 34). Sugita, in col 7, lines 49-52, and in col 64, lines 65-67, in col 65, lines 1-5, discloses forming a mask using a laser (claims 8, 19, 25). Sugita, in col 5, lines 1-59, and in col 31, lines 43-57, in col 32, lines 1-27, discloses that the exposure performed through the mask can be modulated (in X, Y, Z planes) and that the mask can perform at least a binary exposure, wherein the illumination is defocused with varying intensities (as defined by the mask pattern) (claims 9, 20, 26).

The difference between the claims and Sugita is that Sugita does not disclose that the edge portions of the mask are intentionally meandered (claim 27). Sugita does not disclose that the exposure processes performed reduces seam lines. Sugita does not disclose that the mask has opposed first and second intentionally meandering edge portions. Sugita does not disclose that the meandering of the meandering edge portions are periodic and that the period of meandering is substantially smaller, at least an order of magnitude smaller than the dimension of the mask (claims 28-29, and 33).

Nakasuji, in col 2., lines 33-47, in and in col 6, lines 13-40, discloses a reticle that

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has edges that are intentionally meandered (sub-fields, reference 91 of figure 5(B)).

Nakasuji, in the abstract, and in col 2, lines 29-47, discloses using the reticle with subfields (meandering edges) in lithographic methods so as to reduce seam lines (stitching errors). Nakasuji, in col 6, lines 13-64, in col 7, lines 26-29, and in figure 5 (B), discloses that a reticle with all of the edges (all outer edges of the reticle) as intentionally meandering edges (subfields, reference 91), that are periodic with a period that is less than the dimension of the mask (the skirts (references 91, and 93 of figures 5(B), and 5(C)) in the reticle are not imaged or exposed, significantly smaller than the dimension of the mask).

Therefore it would be obvious to a skilled artisan to modify Sugita by employing the mask with subfields (meandered edges) as taught by Nakasuji, because Nakasuji, in col 2, lines 29-47, and in col 7, lines 26-31, discloses that using reticles with subfields (with meandering edges) for exposure results in the formation of pattern images that are contiguous and are properly stitched together such that defects arising from subfield stitching errors are reduced.

3. Claims 6-7, 17-18, 23-24, and 31, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,534,242 (Sugita et al., hereinafter referred to as Sugita) in view of U. S. Patent No. 6,444,399 (Nakasuji) as applied to claims 1-4, 8-12, 15, 19-22, 25-30, 33, and 34 above, and further in view of U. S. Patent Application Publication No. 2002/0146627 (Suleski et al., hereinafter referred to as Suleski).

Sugita in view of Nakasuji is discussed in paragraph no. 2.

The difference between the claims and Sugita in view of Nakasuji is that Sugita in

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view of Nakasuji does not disclose that the mask is a grayscale mask (claims 6, 17, 23, and 31). Sugita in view of Nakasuji does not disclose that the mask is formed of High Energy Beam Sensitive (HEBS) glass (claims 7, 18, and 24).

Suleski, in [0044], and [0048], discloses using HEBS glass for making gray scale masks, and using the gray scale mask in a lithographic process.

Therefore, it would be obvious to a skilled artisan to modify Sugita in view of Nakasuji by using the HEBS glass to form a mask and by employing the gray scale mask suggested by Suleski in the exposure process because Suleski, in [0044] discloses that creating the gray scale mask in a HEBS glass results in true gray scale mask in which the transmission is varied in accordance with exposure to a high energy beam and Suleski in [0062], discloses that using the gray scale mask enables the creation of the structures in the photoresist in a simple and cheap manner and prevents the need for injection molding.

4. Claims 13-14, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,534,242 (Sugita et al., hereinafter referred to as Sugita) in view of U. S. Patent No. 6,444,399 (Nakasuji) as applied to claims 1-4, 8-12, 15, 19-22, 25-30, 33, and 34 above, and further in view of U. S. Patent NO. 5,045,438 (Adachi).

Sugita in view of Nakasuji is discussed in paragraph no. 2.

The difference between the claims and Sugita is that Sugita does not disclose electroplating the substrate contour to form a master (claim 13). Sugita does not disclose that the master is used for molding a desired contour (claim 14).

Adachi, in col 3, lines 65-68, and in col 4, lines 1-10, and lines 63-68, in col 5,

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lines 1-4, discloses electroplating the substrate with the pattern to form a stamper (master) and using the stamper (as a mold) to perform molding.

Therefore, it would be obvious a skilled artisan to modify Sugita by employing the electroplating process to form a master as taught by Adachi because Sugita, in col 64, lines 65-67, in col 65, lines 1-3, discloses forming a master (mask from the exposure processes) in order to form the circuits based on the circuit pattern design onto the resist layer, and Adachi, in col 3, lines 35-55, discloses that such process enables reduced or almost negligible tracking error and read error in reproducing or recording procedure.

Response to Arguments

5. Applicant's arguments filed May 30, 2006, with respect to claims 1-4, 6-15, 17-31, and 33-34, have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published

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applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

August 21, 2006.



JOHN A. MCPHERSON
PRIMARY EXAMINER